

CHIP MONOLITHIC CERAMIC CAPACITOR

GMA05XR71E152MA11_ (0202, X7R, 1500pF, 25Vdc)

_: packaging code

Reference Sheet

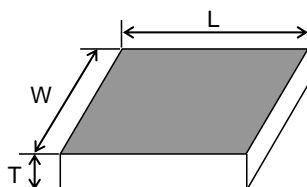
1.Scope

This product specification is applied to Monolithic Microchip Capacitor used for General Electronic equipment.

2.MURATA Part NO. System

| | | | | | | | | | |
|-------|----------------------|--------------------|-----------------------------------|------------------------|---------------------------|-----------------------------|-----------------------------|----------------------|---|
| (Ex.) | GMA | 05 | X | R7 | 1E | 152 | M | A11 | T |
| | (1)L/W Dimensions | (2)T Dimensions | (3)Temperature Characteristics | (4)DC Rated Voltage | (5)Nominal Capacitance | (6)Capacitance Tolerance | (7)Murata's Control Code | (8)Packaging Code | |

3. Type & Dimensions



(Unit:mm)

| (1)-1 L | (1)-2 W | (2) T |
|----------|----------|-----------|
| 0.5±0.05 | 0.5±0.05 | 0.35±0.05 |

4.Rated value

| (3) Temperature Characteristics (Public STD Code):F(EIA) | | (4) DC Rated Voltage | (5) Nominal Capacitance | (6) Capacitance Tolerance | Specifications and Test Methods (Operationg Temp. Range) |
|---|----------------------------|----------------------------|----------------------------|---------------------------------|---|
| Temp. coeff or Cap. Change | Temp. Range (Ref.Temp.) | | | | |
| -15 to 15 % | -55 to 125 °C (25 °C) | 25 Vdc | 1500 pF | ±20 % | -55 to 125 °C |

5.Package

| mark | (8) Packaging | Packaging Unit |
|------|---------------|----------------|
| T | Bulk Tray | 400 pcs./Tray |

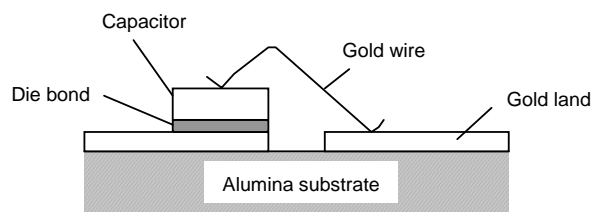
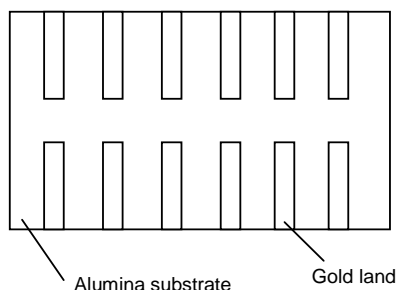
Product specifications in this catalog are as of Aug.3,2011,and are subject to change or obsolescence without notice.
Please consult the approval sheet before ordering.
Please read rating and !Cautions first.

■SPECIFICATIONS AND TEST METHODS

| No | Item | Specification | | Test Method | | | | | | | | | | |
|-----------|---|--|--|--|-----------|-----------------|---------|-----------|---|-------|---|------|---|-------|
| 1 | Operating Temperature Range | R7 : -55°C to +125°C | | Reference Temperature:25°C | | | | | | | | | | |
| 2 | Rated Voltage | See the previous pages. | | The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V^{P-P} or V^{O-P} , whichever is larger, should be maintained within the rated voltage range. | | | | | | | | | | |
| 3 | Appearance | No defects or abnormalities. | | Visual inspection. | | | | | | | | | | |
| 4 | Dimensions | Within the specified dimensions. | | Using calipers. | | | | | | | | | | |
| 5 | Dielectric Strength | No defects or abnormalities. | | No failure should be observed when a voltage of 250% of the rated voltage is applied between the both terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. | | | | | | | | | | |
| 6 | Insulation Resistance | More than 10,000MΩ or 500Ω·F (Whichever is smaller) | | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging. | | | | | | | | | | |
| 7 | Capacitance | Within the specified tolerance. | | The capacitance/D.F. should be measured at reference temperature at the frequency and voltage shown in the table. | | | | | | | | | | |
| 8 | Dissipation Factor (D.F.) | R7 : W.V.: 25Vmin.: 0.025max. W.V.: 16/10V : 0.035max. W.V.: 6.3V : 0.05max. | | <table><tr><td>Frequency</td><td>1±0.1kHz</td></tr><tr><td>Voltage</td><td>1±0.2Vrms</td></tr></table> | Frequency | 1±0.1kHz | Voltage | 1±0.2Vrms | | | | | | |
| Frequency | 1±0.1kHz | | | | | | | | | | | | | |
| Voltage | 1±0.2Vrms | | | | | | | | | | | | | |
| 9 | Capacitance Temperature Characteristics | No bias | R7 : Within ±15% (-55°C to +125°C) | <p>The capacitance change should be measured after 5min. at each specified temp.stage.</p> <p>•The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.*</p> <table><tr><td>Step</td><td>Temperature(°C)</td></tr><tr><td>1</td><td>25±2</td></tr><tr><td>2</td><td>-55±3</td></tr><tr><td>3</td><td>25±2</td></tr><tr><td>4</td><td>125±3</td></tr></table> <p>*Initial measurement for high dielectric constant type</p> <p>Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature.</p> <p>Perform the initial measurement.</p> | Step | Temperature(°C) | 1 | 25±2 | 2 | -55±3 | 3 | 25±2 | 4 | 125±3 |
| Step | Temperature(°C) | | | | | | | | | | | | | |
| 1 | 25±2 | | | | | | | | | | | | | |
| 2 | -55±3 | | | | | | | | | | | | | |
| 3 | 25±2 | | | | | | | | | | | | | |
| 4 | 125±3 | | | | | | | | | | | | | |
| 10 | Mechanical Strength | Bond Strength | Pull force : 0.03N min. | MIL-STD-883 Method 2011 Conition D Mount the capacitor on a gold metallized alumina substrate with Au-Sn(80/20) and bond a 25μm(0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire. | | | | | | | | | | |
| | | Die Shear Strength | Die Shear force : 2N min. | MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn(80/20). Apply the force parallel to the substrate. | | | | | | | | | | |
| 11 | Vibration Resistance | Appearance | No defects or abnormalities. | Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minite. Amplitude : 1.5 mm(0.06 inch) max. total excursion. Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours). | | | | | | | | | | |
| | | Capacitance | Within the specified tolerance. | | | | | | | | | | | |
| | | D.F. | R7 : W.V.: 25Vmin.: 0.025max. W.V.: 16/10V : 0.035max. W.V.: 6.3V : 0.05max. | | | | | | | | | | | |

| No | Item | Specification | | Test Method | | | | | | | | | | | | | | | |
|------|--|--------------------|--|---|------------|---------------------------|------------|---|---|-----------|---------------------------|------------|---------------------------|------------|------------|------|--------|------|--------|
| 12 | Temperature Cycle | Appearance | No defects or abnormalities. | <p>The capacitor should be set for 24±2 hours at room temperature after one hour heat of treatment at 150 +0/-10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for 24±2 hours at room temperature, then measure.</p> <table><tr><td>Step</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Temp.(°C)</td><td>Min. Operating Temp.+0/-3</td><td>Room Temp.</td><td>Max. Operating Temp.+3/-0</td><td>Room Temp.</td></tr><tr><td>Time(min.)</td><td>30±3</td><td>2 to 3</td><td>30±3</td><td>2 to 3</td></tr></table> | Step | 1 | 2 | 3 | 4 | Temp.(°C) | Min. Operating Temp.+0/-3 | Room Temp. | Max. Operating Temp.+3/-0 | Room Temp. | Time(min.) | 30±3 | 2 to 3 | 30±3 | 2 to 3 |
| | | Step | 1 | | 2 | 3 | 4 | | | | | | | | | | | | |
| | | Temp.(°C) | Min. Operating Temp.+0/-3 | | Room Temp. | Max. Operating Temp.+3/-0 | Room Temp. | | | | | | | | | | | | |
| | | Time(min.) | 30±3 | | 2 to 3 | 30±3 | 2 to 3 | | | | | | | | | | | | |
| | | Capacitance Change | R7 : Within ±7.5% | | | | | | | | | | | | | | | | |
| D.F. | R7 : W.V.: 25Vmin.: 0.025max. W.V.: 16/10V : 0.035max. W.V.: 6.3V : 0.05max. | | | | | | | | | | | | | | | | | | |
| I.R. | More than 10,000MΩ or 500 Ω · F (Whichever is smaller) | | | | | | | | | | | | | | | | | | |
| | Dielectric Strength | No defects. | | | | | | | | | | | | | | | | | |
| 13 | Humidity (Steady State) | Appearance | No defects or abnormalities. | <p>Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% humidity. Take it out and set it for 24±2 hours at room temperature, then measure.</p> | | | | | | | | | | | | | | | |
| | | Capacitance Change | R7 : Within ±12.5% | | | | | | | | | | | | | | | | |
| | | D.F. | R7 : W.V.: 10Vmin.: 0.05max. W.V.: 6.3V : 0.075max. | | | | | | | | | | | | | | | | |
| | | I.R. | More than 1,000MΩ or 50 Ω · F (Whichever is smaller) | | | | | | | | | | | | | | | | |
| 14 | Humidity Load | Appearance | No defects or abnormalities. | <p>Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to 95% humidity and set it for 24±2 hours at room temperature, then measure.</p> <p>The charge/discharge current is less than 50mA.</p> | | | | | | | | | | | | | | | |
| | | Capacitance Change | R7 : Within ±12.5% | | | | | | | | | | | | | | | | |
| | | D.F. | R7 : W.V.: 10Vmin.: 0.05max. W.V.: 6.3V : 0.075max. | | | | | | | | | | | | | | | | |
| | | I.R. | More than 500MΩ or 25 Ω · F (Whichever is smaller) | | | | | | | | | | | | | | | | |
| 15 | High Temperature Load | Appearance | No defects or abnormalities. | <p>A voltage treatment should be given to the capacitor, in which a DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature ±3°C then it should be set for 24±2 hours at room temperature and the initial measurement should be conducted.</p> <p>Then apply the above mentioned voltage continuously for 1000±12 hours at the same temperature, remove it from the bath, and set it for 24±2 hours at room temperature, then measure.</p> <p>The charge/discharge current is less than 50mA.</p> | | | | | | | | | | | | | | | |
| | | Capacitance Change | R7 : Within ±12.5% | | | | | | | | | | | | | | | | |
| | | D.F. | R7 : W.V.: 10Vmin.: 0.05max. W.V.: 6.3V : 0.075max. | | | | | | | | | | | | | | | | |
| | | I.R. | More than 1,000MΩ or 50 Ω · F (Whichever is smaller) | | | | | | | | | | | | | | | | |

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No.11 to 15 are performed.



⚠CAUTION

■ Limitation of use

Please contact our sales representatives or product engineers before using our products for the applications listed below which require of our products for other applications than specified in this product.

- ① Aircraft equipment ② Aerospace equipment ③ Undersea equipment ④ Power plant equipment
- ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.) ⑦ Traffic signal equipment
- ⑧ Disaster prevention / crime prevention equipment ⑨ Data-processing equipment
- ⑩ Application of similar complexity and/or requirements to the applications listed in the above

⚠CAUTION

■ Die Bonding of capacitors

- Use the following materials

Braze alloy :

Au-Sn (80/20) 300 to 320°C in N₂ atmosphere

- Mounting

- ① Control the temperature of the substrate so that it matches the temperature of the braze alloy.
- ② Place braze alloy on substrate and place the capacitor on the alloy. Hold the capacitor and gently apply the load. Be sure to complete the operation in 1 minute.

⚠CAUTION

■ Note the following to prevent quality degradation.

- ① Store the capacitors in an environment whose temperature and relative humidity range from 5 to 40°C and 20 to 70%RH respectively and away from direct sunlight and shock.
- ② Avoid storing the capacitors in an atmosphere containing corrosive gases (Cl₂, H₂S, SO₂, NO_x, etc.).
- ③ Do not directly touch capacitors with hands.
- ④ Please consult us in advance when using mounting methods other than the standard methods described above.

⚠NOTICE

■ Wire Bonding

- Wire

Gold wire : 25μm(0.001 inch) diameter

- Bonding

- ① Thermocompression, ultrasonic ball bonding. Required stage temperature : 150 to 200°C.
- ② Required wedge or capillary weight : 0.2N to 0.5N.
- ③ Bond the capacitor and base substrate or other devices with gold wire.

⚠NOTE

- 1. Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 2. You are requested not to use our product deviating from this product specification.
- 3. We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.